

We Claim:

1. A method for removing contaminants from flat media carriers, comprising the steps of:

5 loading the carriers onto a rotor within a flat media carrier cleaning machine;

spinning the rotor;

spraying a water/surfactant mixture onto the carriers via an inlet line by the steps of:

10 injecting water into the inlet line,

measuring the flow of water entering the inlet line,

15 pumping surfactant from a storage vessel into the inlet line using a flow metering pump,

mixing the surfactant and water to obtain a surfactant/water mixture,

20 setting flow rate of the flow metering pump to achieve a desired concentration of surfactant for the surfactant/water mixture.

2. A method according to Claim 1 further comprising the steps of

discontinuing pumping surfactant;

rinsing the carriers by spraying the carriers only with water.

3. A method according to Claim 2 further comprising the
5 steps of
discontinuing injecting of water into the inlet line;
drying the carriers by spraying the carriers with a dry
gas.

10 4. A method according to Claim 4 wherein the dry gas is
selected from the group consisting of: nitrogen and compressed
air.

15 5. A method according to Claim 1 wherein the water
comprises de-ionized water.

20 6. A method according to Claim 1 further comprising the
step of spinning the rotor at from 1-50 rpm while spraying the
mixture toward the carriers.

7. A method according to Claim 1 further comprising the
step of adjusting flow rate of surfactant being pumped into the
inlet line by adjusting operation of the metering pump.

8. A method according to Claim 1 wherein the surfactant and water are injected into the inlet line via and under the control of a mixing control valve.

5 9. An apparatus for cleaning flat media carriers, comprising:

a rotor rotatably mounted within a chamber;

10 a first inside array of nozzles and a first outside array of nozzles arranged to spray fluid onto a media carrier on the rotor;

a first control valve connected by a first fluid line to the first inside array of nozzles;

a first water inlet line for providing water to the first control valve;

15 a first flow meter for measuring water flow through the first water inlet line;

a second control valve connected by a second fluid line to the first outside array of nozzles;

20 a second water inlet line for providing water to the second control valve;

a second flow meter for measuring water flow through the second water inlet line;

a surfactant storage vessel;

a first surfactant injection line connecting the surfactant storage vessel to the first control valve;

5 a first metering pump in the first surfactant injection line for pumping surfactant directly from the surfactant storage vessel to the first control valve at a controllable pumping rate;

a second surfactant injection line connecting the surfactant storage vessel to the second control valve;

10 a second metering pump in the second surfactant injection line for pumping surfactant directly from the surfactant storage vessel to the second control valve at a controllable pumping rate;

15 a pressurized water source connectable to the first and second inlet water lines.

10. An apparatus according to Claim 9 further comprising a housing around the chamber.

20 11. An apparatus according to Claim 9 further comprising a boost pump connected to the water source for providing a desired inlet water pressure to the first and second water inlet lines.

12. An apparatus according to Claim 9 wherein the flow rates of each of the first and second metering pumps is separately controllable for providing a desired surfactant concentration in the surfactant/water mixture for each of the first and second fluid lines.

13. An apparatus according to Claim 9 further comprising a surfactant return line connected between the first surfactant injection line proximate the first control valve and the surfactant storage vessel for providing a return path for surfactant back to the surfactant storage vessel.

14. An apparatus according to Claim 9 further comprising a recirculation line connected between the first water inlet line proximate the first control valve and the water source for providing a recirculation path for water back to the water source.

15. An apparatus according to Claim 9 wherein the first control valve comprises a mixing control valve for mixing the water and surfactant.

16. An apparatus for cleaning media carriers, comprising:
a rotor rotatably mounted within a chamber;

a plurality of media carriers insertable into the chamber
onto the rotor;

an inner array of nozzles disposed in the chamber and
arranged to spray fluid onto the media carriers on the rotor;

5 an outer array of nozzles disposed in the chamber and
arranged to spray fluid onto the media carriers on the rotor;

a first control valve connected by a first fluid line to
the inner array of nozzles;

10 a first water inlet line for providing water to the first
control valve;

a second control valve connected by a second fluid line to
the outer array of nozzles;

a second water inlet line for providing water to the second
control valve;

15 a surfactant storage vessel;

a first surfactant injection line connecting the surfactant
storage vessel to the first control valve;

20 a first metering pump in the first surfactant injection
line for pumping surfactant from the surfactant storage vessel
to the first control valve at a controllable pumping rate;

a second surfactant injection line connecting the
surfactant storage vessel to the second control valve;

a second metering pump in the second surfactant injection line for pumping surfactant from the surfactant storage vessel to the second control valve at a controllable pumping rate;

5 a water source connected to the first and second control valves;

means for controlling pumping rate of each of the first and second metering pumps to produce a desired surfactant concentration in the surfactant/water mixtures being provided in the first and second fluid lines to each of the inner and outer arrays of nozzles.

10 17. An apparatus according to Claim 16 further comprising a first flow meter disposed in the first water inlet line for measuring flow rate of water being provided to the first control valve;

15 a second flow meter disposed in the second water inlet line for measuring flow rate of water being provided to the first control valve.

20 18. An apparatus according to Claim 16 wherein the first control valve comprises a mixing control valve for mixing the surfactant and the water.

19. An apparatus according to Claim 16 further comprising
a surfactant return line connected between the first surfactant
injection line proximate the first control valve and the
surfactant storage vessel for providing a return path for
5 surfactant back to the surfactant storage vessel.

20. An apparatus according to Claim 16 further comprising
a recirculation line connected between the first water inlet
line proximate the first control valve and the water source for
providing a recirculation path for water back to the water
source.

21. An apparatus according to Claim 16 further comprising
a first distribution manifold disposed in the first fluid
15 line;

a plurality of inner nozzle manifolds connected to the
first distribution manifold, each inner nozzle manifold having a
plurality of inner nozzles connected thereto, wherein the first
distribution manifold distributing surfactant/water mixture to
20 the inner nozzle manifolds;

a second distribution manifold disposed in the second fluid
line;

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5 a plurality of outer nozzle manifolds connected to the
second distribution manifold, each outer nozzle manifold having
a plurality of outer nozzles connected thereto, wherein the
second distribution manifold distributing surfactant/water
mixture to the outer nozzle manifolds.

22. An apparatus according to Claim 16 wherein said first
metering pump comprises a positive displacement diaphragm pump,
and wherein said means for controlling pumping rate of the first
metering pump comprises means for adjusting pumping speed.

23. An apparatus according to Claim 21 wherein said means
for controlling pumping rate of the first metering pump further
comprises means for adjusting pump stroke length.